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OF PLANETARY QUARANTINE MEASURES FOR
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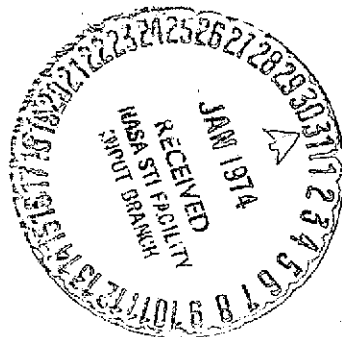
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SCIENTIFIC AND TECHNICAL SERVICES
DIRECTED TOWARD THE DEVELOPMENT OF
PLANETARY QUARANTINE MEASURES FOR AUTOMATED SPACECRAFT

Third Quarterly Report
Contract NASw-2503

For
National Aeronautics and Space Administration
Planetary Quarantine Office
Washington, D. C. 20546

January 7, 1974



by
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SCIENTIFIC AND TECHNICAL SERVICES
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PLANETARY QUARANTINE MEASURES FOR AUTOMATED SPACECRAFT

INTRODUCTION

This report constitutes the Third Quarterly Progress Report summarizing work performed through December 31, 1973 under contract NASw-2503. The contract provides for Exotech Systems, Inc. to work in twelve task areas in direct support of NASA's Planetary Quarantine Officer. The contract period is one year commencing April 1, 1973 and ending March 31, 1974.

TASK PROGRESS

Progress during the reporting period of October 1, 1973 – December 31, 1973 is described in this section for the twelve contract tasks.

Task 1. Evaluation of the Impact of Changes in Planetary Quarantine Requirements

Under this task, evaluations are conducted to support the justification and establishment of planetary quarantine requirements and parameters and to estimate their implications upon flight projects.

Review of the Stanford Research Institute draft report entitled, "A Probabilistic Model of Planetary Contamination: Project Viking," by B.R. Judd and D. Warner North was undertaken. Discussions and further review of the document were held at a Meeting at the NASA/Ames Research Center on October 25.

Task 2. Maintain and Operate the Planetary Quarantine Document System

The Quarantine Document System (QDS) is an indexed file of material pertinent to the review of flight project quarantine plans and operations. This task covers the operation, maintenance and updating of the system.

During the reporting period the collection experienced continued growth and use. The collection now numbers 810 documents.

Pertinent retrievals were made in support of activities relating to several tasks of this contract.

Task 3. Microbial Contamination Logs

The Committee on Space Research (COSPAR) has asked each launching nation to supply it with information on planetary missions for the maintenance of a contamination log. For record purposes and to establish the allocation of contamination probabilities to future missions to planets of biological interest, the PQO requires a log of missions of all nations insofar as data are available. This task supports the preparation and maintenance of these logs.

Microbial Contamination Logs are being continuously updated as new information becomes available. The retargeting of Pioneer 11, soon to be executed, is followed closely since one of the options under consideration is to place the spacecraft in a Saturn fly by trajectory. If this option is exercised, a contamination log will be established for the planet Saturn.

Task 4. Maintenance of Allocation Bank

The United States, the Union of Soviet Socialist Republics and other launching nations are allotted portions of the total probability of contamination of each planet and provided with estimates of the total number of missions expected to be flown. From these data, the Planetary Quarantine Officer makes pre-launch allocations of the probability of contamination that may be used by each flight project. The purpose of this task is to assist the Planetary Quarantine Officer in making the optimum allocation, consistent with NASA and COSPAR policies, to each United States mission.

Results of the Pioneer 10 and Pioneer 11 flights are continuously reviewed for possible effects on the allocation banks for Jupiter and, possibly, Saturn. Changes are being reflected on the NASA PQ Status Board as they occur.

Task 5. Creation and Maintenance of List of Approved Parameters

Uniformity of policy and facilitation of document review can be effected through a listing of parameters and requirements employed by flight projects in validating compliance with basic PQ constraints. This task covers the preparation of such a listing with definitions, references to pertinent research, and approved numerical values or ranges.

After the review and assessment of 30 separate parameters a document was prepared containing specification sheets for each parameter approved by the PQO for use or for planning purposes by unmanned planetary space programs. This document was issued under NASA cognizance to appropriate NASA Centers, flight projects and active contractor personnel.

Task 6. Preparation of Technical Information Memo

The Planetary Quarantine Technical Information Memo (TIM) is a brief, informal newsletter containing summaries of research results of note, meetings, significant travel plans, policy decisions, changes in personnel, initiation of new research tasks, and management deadlines.

In line with the direction received as to the issuance of the TIMs, which was to issue TIMs only as pertinent subject matter is available rather than per any standard calendar period, no TIMs were issued during this reporting period.

Task 7. Evaluation of Flight Project Quarantine Plans

This task provides support to the PQO in the review and approval of flight project documentation demonstrating compliance with PQ requirements.

During this reporting period, the following documents were reviewed:

Pioneer 11 Pre-Maneuver Analysis of Probability of Contamination to the Planet Jupiter.

Pioneer 11 Pre-Maneuver Analysis of Probability of Contamination to the Planet Saturn.

Revised copy, "Viking '75 Program Planetary Quarantine Plan," M75-145-0.

Revised copy, "Viking '75 Lander Capsule Sterilization Plan," M75-147.

Revised copy, "Viking '75 Program Microbiological Assay and Monitoring Plan," M75-148-0.

The two Pioneer 11 Pre-Maneuver analysis reports were found satisfactory and were recommended to the PQO for approval.

The preliminary drafts of the three Viking '75 plans were revised during this reporting period to incorporate all the changes agreed upon at the Viking '75 Program PQ Plan review meeting of September 25-26, 1973. The revised versions of the three plans were reviewed in detail and are in the process of being recommended for PQO approval. In connection with our review of the Viking '75 PQ Plans, working sessions have commenced in Langley, Virginia during which review and discussion of all pertinent models were initiated. These models included the Bio-Burden Model, the Sterilization Model and the PQ Model.

In addition to the plans and the models, other documents relating to pertinent analyses were received and reviewed.

As a result of our working sessions at Langley, Virginia, and the documents received and reviewed, a working PQ milestone schedule was issued with a copy submitted to the PQO. This working review activity of the Viking Models, reports, and analyses will be a continuing major effort during the coming year.

Task 8. Supporting Analysis of Planetary Quarantine Sterilization Parameters

This task includes analyses and evaluations intended to support the interpretation of research results and to facilitate the quantification of PQ requirements.

Currently, preliminary consideration is being given to a Mars Surface Sample Return Mission (MSSR) by NASA. ESI effort has been devoted during this reporting period to reviewing the current studies, mission options, and scientific questions relevant to this activity. Preliminary identification has been made of the risk elements and analysis tasks necessary for such return missions. Effort will continue to review ongoing activities and to identify the basic possible risk analysis approaches which might be applicable to this type sample return missions.

Task 9. Preparation of Technical Presentations

This task relates to the preparation of written and graphic material as required by the PQO for publications, briefings, speeches on PQ subjects and communications to individuals and groups.

During this reporting period work continued with the Editor of the CRC Critical Reviews in the final preparation of a paper on control aspects of PQ.

Summarizations of technical data in graphical form was developed for the Planetary Quarantine Officer to support the presentation he gave at the meeting on Mars Sample Return Missions held at the NASA/Ames Research Center on October 24-25, 1973.

Task 10. Technical Support at Meetings

The PQO has frequent need for technical support relative to meetings of the LSC, SSB, COSPAR, flight project PQ working groups and experimenters'

conferences. This task covers the provision of this support on request of the PQO and includes the compilation of analytical data, attendance at specified meetings and presentations as requested.

Such support was provided for the following meetings and conferences:

October 4/5	Viking PQ Review Meeting	Hampton, Va.
October 24/25	Mars Surface Sample Return Symposium	NASA/Ames, Moffett Field, Calif.
October 25	Viking PQ Analysis Meeting	SRI, Calif.
November 1/2	AIBS Planetary Quarantine Panel	Cape Kennedy, Fla.
December 19/20	Viking PQ Review Meeting	Hampton, Va.

Task 11. Support of Technology Transfer

This task supports the transfer of PQ technology between Centers, between Centers and Projects, between NASA and its contractors and between NASA and the scientific community. It covers such activities as the preparation of technical presentations and technical support at meetings (subjects of Tasks 9 and 10), as well as the dissemination of PQ technology information upon referral of inquiries by the PQO and the preparation of material for the AIBS PQ Panel.

No activity performed during this reporting period.

Task 12. Integrated Resumes of NASA Research

This task is intended to provide resumes of research combining all relevant data from all sources on a specific subject.

No specific assignments have been made under this task during this reporting period.